Growing Cladophora in the Laboratory

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After several abortive attempts to keep *Cladophora* alive in the laboratory, the writer has used the apparatus shown in Figure 1 with success.

C. glomerata (L.) Kützing is a plant of well aerated waters, in fact the specimens used were gathered from rocks below a weir where they were constantly splashed. The device was conceived with the idea of furnishing aeration and possibly some motion in the fluid.

The contrivance is simple to construct and operate. On a shelf about 27″ above the laboratory table is placed a one-gallon bottle (A) with a siphon tube of ¼″ o.d. rubber (B) which has its outer end steadied by passing it through a 5⁄16″ hole in the wooden support (C), and which is in turn secured by the clamp (D) to the edge of the shelf. Immediately beneath the siphon tube a 5⁄16″ hole in the shelf forms a support for the thistle tube (F). To the lower end of the thistle tube a glass "tee" (G) is attached by a 2″ length of rubber tube (H). The stand (S) is made of wooden battens ¾″ x 1½″ and is 10″ high with top batten about 7″ long, having two 5⁄16″ holes about 5″ apart through which are passed the rubber tube (J) attached to the lower end of the "tee" and the glass tube (M) which is joined to the branch of the "tee" by the rubber tube (L). The tube (J) is led to the bottom of a 16 oz. flask (K) which is stood in a beaker (T). The glass tube (M) extends to the bottom of the 250 c.c. flask (N).

The end of the siphon tube (B) is plugged with a conical plug at E. Details of this plug are shown at E′. The plug in use is made of maple and is 1″ long and a little less than ¼″ diameter at the thick end. That end is cut flat and with fairly sharp edges. Grooves are cut in the sides as shown. These grooves do not extend closer to the thick end than ¼″.

To start operations, fill bottle A seven-eighths full and flask K completely with water and place about 200 c.c. of nutrient fluid in flask N. Set the siphon going and adjust the plug E until the speed of dripping is about three drops in five seconds. Now arrange the support C so that the drops fall directly into the throat of the thistle tube.

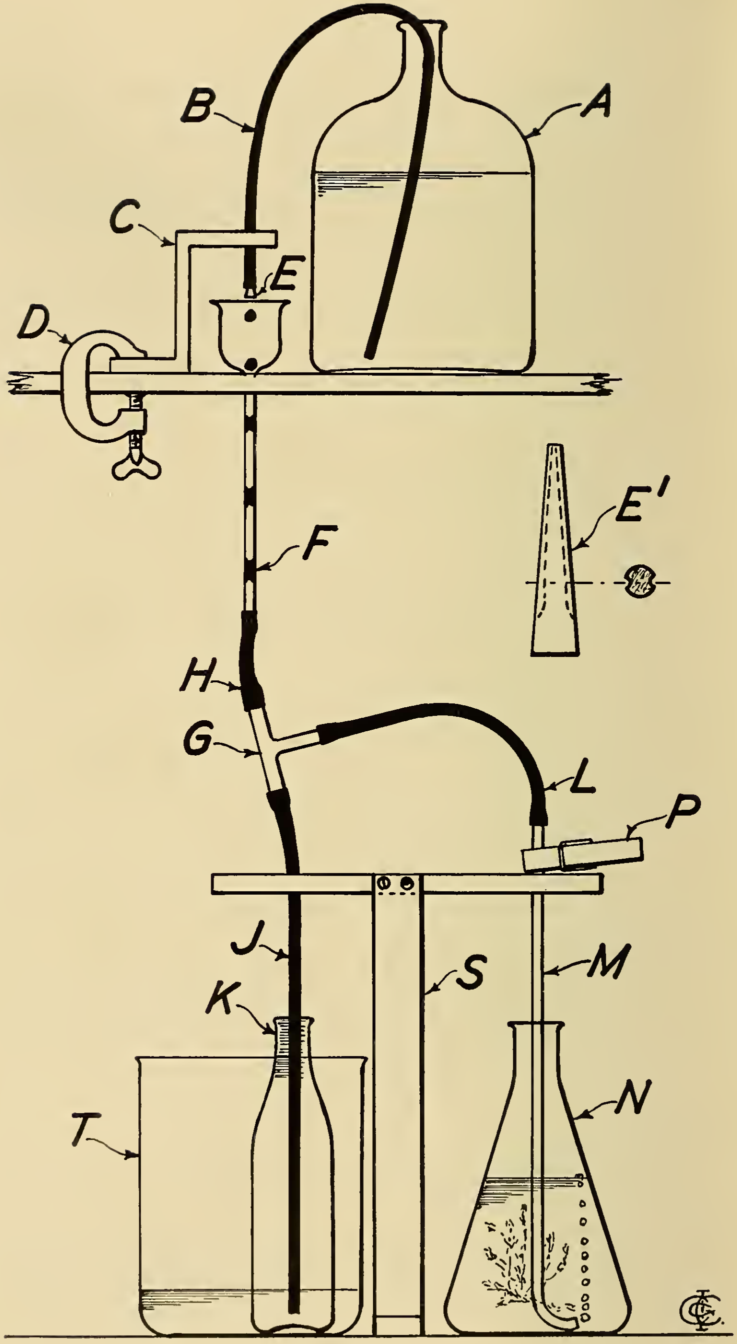

Figure 1

Since the tube M has its lower end immersed in about two inches of fluid, a definite pressure is required to force air from it. The lower end of tube J is sealed by the water in K. Therefore, when a drop of water from E falls into the tube F it forms a slug which slightly compresses the air trapped in the system and the slug comes to rest a little below the throat of the thistle. The next drop, falling squarely into the upper end of F traps a slug of air, and the first slug of water moves down further compressing air in the system, while the second slug slides into the tube above the intercepted air. The fourth or fifth drop will so increase the pressure that the air in tube L–M will burst through the liquid in the flask N in a series of bubbles, agitating the contents of the flask and allowing the slugs of air and water in F to travel downwards rapidly until the reduced pressure is again balanced by the fluid over the bottom end of M. Slugs of water which pass into the "tee" G flow downwards into J and overflow from K into T.

Some simple adjustments may be necessary. A nice balance between the pressures in the two lower tubes J and M is required. The immersed length of tube J must exceed the immersed length of M by an inch or so, to ensure sufficient back pressure to overcome the resistance in M and permit some oscillation in the air volume. The flask K, therefore, should be not less than 6″ tall. The relative vertical positions of K and N may require adjustment by setting one or the other on a wooden block. The greatest difficulty is to ensure that no water from F passes into L and thence into N. Any such addition to N will spoil the adjustment of the nutrient fluid. If the "tee" G is left in a vertical position the capillary action of the branch and the velocity of air in the tube will carry a part of every water slug into L. By moving the whole of the bottom set-up sideways and securing the tube M at a correct height by means of the spring clothes-pin P, it was found possible to cause the water slugs to break in G so that the liquid ran down the side away from the branch. The film on the branch side also broke at the entrance to the branch and any water splashed into the branch flowed back into J. Any contamination of the water causing soapiness will also cause water to be carried into the branch through the film not breaking at the entrance.

It is advisable not to cut the grooves in the plug E too deeply at first; gradually deepen or add grooves as found necessary in order to get the required speed of drip. The height of E above the thistle should be about 1¾″ to 2″. When properly positioned the drop traps the air slug with a characteristic *bop*. Unless the drops fall squarely the water will run directly down the tube into K without pumping air. Occasional adjustments are found to be necessary as the plug swells or becomes foul.

As described, the apparatus will use about a gallon of water a day. The writer siphons the overflow in T night and morning and replaces it in A. Occasionally an additional half-pint is added to make up for evaporation.

The equipment should be run for several hours before placing the plants in the nutrient solution.

The device was set going in September and the specimens remained in the water in which it was collected, with slight additions of tap water to make up for evaporation. At the end of four months the specimen was fresh, and there was no accumulation of bacterial scum. The water was then replaced with Detmer's solution, concentration 6 per 10,000, and now (February) the plant is showing growth.

The writer contemplates setting up a battery of these aerating devices in which water directly from the tap will be used by passing it through a header having small branches and stop cocks and using drig plugs of glass or plastic material. The present "tees" will be replaced with some having much larger diameter so that the change of sectional area will ensure every water slug being broken. The flasks (K) will overflow directly into a drain. Such an outfit should require practically no attention.

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FIELD TRIPS OF THE CLUB

Trip of July 5–7, 1940, to the Pennsylvania State College Nature Camp, Seven Sister Mountains, Pa.

Upon arrival at the camp in the midst of a forest preserve, the seven members and guests were cordially greeted by Prof. George R. Green, Director of the Nature Camp, and his staff, Miss Farida A. Wiley, Dr. Oliver P. Medsger and Prof. George J. Free.